

THE MINING JOURNAL,

PUBLIC COMPANIES.

MEETINGS.

CONSOLIDATED COPPER MINES OF COBRE ASSOCIATION.—Notice is hereby given, that a HALF-YEARLY GENERAL MEETING of the proprietors of this association will be held, in conformity with the deed of settlement, at the office of the company, 26, Austin Friars, on Tuesday, the 12th day of January next, at One o'clock precisely. On that day two directors, namely, Russell Eliot and John Hardy, Esq., and one auditor, Walter Sharp, Esq., will go out of office, agreeably to the deed of settlement, but are immediately re-eligible, and are candidates for re-election. It is necessary that parties intending to offer themselves as candidates for the direction and administration should leave notice of such their intention with the secretary, at the office of the company, 26, Austin Friars, at least fourteen clear days before the day of election.

By order of the court of directors,

26, Austin Friars, Dec. 31. WILLIAM LECKIE, Sec.

DE DUNSTANVILLE MINING COMPANY.—The directors of the above company give notice, that a HALF-YEARLY GENERAL MEETING of the shareholders will be held at the office of the company, on Tuesday, the 12th day of January next, at One o'clock precisely, when the directors will make their report, and declare a dividend.

26, Bircham-lane, London, December 23.

ROYAL SANTIAGO MINING COMPANY.—Notice is hereby given, that a GENERAL MEETING of the shareholders will be held at the office of the company, on Wednesday, the 6th day of January next, at One o'clock precisely, when the directors will make their report, and declare a dividend.

26, Broad-street buildings, Dec. 21.

WHEAL LEEDS MINING COMPANY.—The directors hereby give notice, that a SPECIAL GENERAL MEETING of the shareholders will be held at the office of the company, on Tuesday, the 12th of January next, at Twelve o'clock, when a statement of the affairs of the company will be laid before them, and their opinion taken on the best measures to be adopted under existing circumstances.

15, Great St. Helen's, Dec. 25.

CALLS.

DE DUNSTANVILLE COPPER MINING COMPANY.—Notice is hereby given, that a CALL of TEN SHILLINGS per share was this day made by the directors on the shareholders of the above mine, to be paid, on or before the 1st of January next, at this office.

26, Bircham-lane, London, Dec. 16.

DANESCOMBE COPPER MINING COMPANY.—Notice is hereby given, that a CALL of TEN SHILLINGS per share was this day made by the directors on the shareholders of the above mine, to be paid, on or before the 1st of January next, at this office.

26, Bircham-lane, London, Dec. 16.

LONDON AND BIRMINGHAM RAILWAY.—FINAL CALL OF EIGHT POUNDS ON THE THIRTY-TWO POUND SHARES.—The directors of the London and Birmingham Railway Company, having resolved that a FOURTH or FINAL INSTALMENT of EIGHT POUNDS per share, payable on or before the 15th of January next, should be called for on the 432 shares of this company, the proprietors of such shares are hereby required to pay, on or before the appointed day, to any one of the undermentioned bankers, the sum of £8 on each of their respective shares, viz.—

London—Messrs. Glyn and Co., 67, Lombard-street; or at the office of the company, Euston Station.

Birmingham—Messrs. J. L. Mouljet and Sons, or the Birmingham Banking Co.

Liverpool—The Bank of Liverpool.

Manchester—Messrs. B. Heywood and Co., or the Bank of Manchester.

The bankers have been severally instructed to charge interest at the rate of 3 per cent. per annum (according to the provisions of the Act of Incorporation) on all sums which shall be tendered after the 15th of January.

GEORGE CARR GLYN, Chairman } of the Board of

J. F. LEDSAM, Deputy Chairman } Directors.

By order, R. CREEDE, Secretary.

Dec. 19.

LANELLY RAILWAY AND DOCK COMPANY.—Notice is hereby given, that the committee of management have made a CALL of TEN POUNDS per share on the ratable shares, issued in August, 1841, and the proprietors thereof are hereby required to pay the same on each and every of such shares, to the credit of the company, at their bankers, Messrs. Coates, Biddulph, and Co., 49, Charing-cross, on or before Monday, the 15th of January next.

By order, JOHN BIGG, Secretary.

49, Old Broad-street, London, Dec. 17.

WANTED, for the BERLIN and STEPPIN RAILWAY.—A quantity of about 7000 tons of RAILS, to be delivered next year, either the whole or greatest part, and the remainder in spring, 1842. Offers will be received at our office till the 20th January next, by letters sealed and marked "Tender for Rails." Particulars of contract and drawings may be had of Messrs. N. M. Rothschild and Sons, London; or Messrs. Zwischenhart and Co., Liverpool.

—Berlin, Dec. 18, 1841.

The directors of the Berlin and Steppin Railway Company.

ROYAL POLYTECHNIC INSTITUTION.—At the EVENING EXHIBITIONS of the ROYAL POLYTECHNIC INSTITUTION, M. LAURENTIN's new CORNET BAND, in imitation of the horn band of the Emperor of Russia, is engaged for a few weeks, and performs in the Great Hall, from a quarter to nine to half past ten o'clock, with a new programme, in two parts, each week, and in the morning from three to five o'clock. The extensive additions, stored with ONE THOUSAND SIX HUNDRED SCIENTIFIC WORKS (various working models), and works of art of great and general interest, as well as the lecture microscope, and new experiments, are both in the morning and evening exhibitions. Open from half past ten to five o'clock, admission 1s. evening, seven to half past ten o'clock, admission 1s. A modified scale for schools. The extensive LABORATORY is OPEN to PUPILS; the chemist conducts assays and analyses.

THE INVENTORS' ADVOCATE, AND JOURNAL OF INDUSTRY.—A WEEKLY BRITISH AND FOREIGN MISCELLANY OF SCIENCE, INVENTIONS, MANUFACTURES, AND ARTS, is the most useful and comprehensive work of the kind published. It contains the scientific intelligence of the week, correct information on railways and steam navigation, list of patents granted and expired; specifications and descriptions of new inventions, reports of scientific meetings, and original papers on manufactures and the arts, with a variety of information interesting to inventors and patentees. It is not only a journal of interest for the day, but forms a standard work of reference, valuable to persons engaged in scientific, manufacturing, and mechanical pursuits. Vols. 1 and 2, neatly bound, are already published, and the 3d Vol. is now in course of publication.

The Inventors' Advocate, price Fivepence, postage free, is published weekly, by the proprietors, at the patent office, No. 192, Strand, London.

NOTICES TO CORRESPONDENTS.

In consequence of the alterations in the arrangement of the tabular matter, the Notices of Meetings, Calls, and Dividends, Latest Intelligence, Railway Returns, &c., will be found in the 8th page.

GLOSSARY OF MINING TERMS.—"H. F." is informed that the pamphlet has been out of print some time; we, however, intend to reprint it, with considerable additions, in the Journal, as soon as the contemplated alterations are perfectly arranged.

Dr. Graham must surely have made a mistake in addressing his advertisement to us. On reference to any Number of our Journal, he will observe, that we are most particular in inserting those advertisements only, which, from having reference to the subjects treated on in our columns, can be of interest to our readers—as prospectuses of new undertakings, notices of calls, meetings, and dividends, descriptions of new inventions, sales of mineral property, scientific notices, and all information likely to interest the capitalist and shareholder.

Several communications are unavoidably postponed.

THE MINING JOURNAL,
Railway and Commercial Gazette.

LONDON, JANUARY 2, 1841.

With the close of the year the pleasing duty devolves on us of expressing our sincere thanks for favours conferred, and the obligations we owe to our several Correspondents and Subscribers for the past—with the commencement of the New Year, it equally behoves us to speak of the future. Our last week's Number closed the Tenth Volume of the MINING JOURNAL—covering a space of between five and six years—and it is with pride we may refer to its columns, as the best evidence afforded by Correspondents of the value attached to it as a medium of communication; while the list of our Subscribers at once affords satisfactory proof of the estimation in which the favours of those Correspondents, and our own labours, are held. The varied and numerous subjects which have formed matter of discussion in the Journal—embracing the "Establishment of a Tin Miners' Smelting Company"—an object accomplished, in a great measure, through the instrumentality of our columns; and that of "A Copper Miners' Smelting Company," which latter has effected all the preliminary arrangements necessary for its successful working; the discussion on the "Use of the Anthracite of South Wales;" the correspondence "On Accidents in

Collieries," embracing the valuable papers communicated by Correspondents, whose experience enables them to write with confidence; with the several articles "On the Patent Wire Rope," and other equally practical papers, are of themselves alone sufficient to establish claims on the miner and the scientific reader for its support, more especially when it is considered that the MINING JOURNAL was the first publication, as it is now the only one, to direct attention to an important branch of national industry. As a record of the operations in the mining districts abroad and at home, and forming a Journal of reference with relation to discoveries and improvements, its pages may be consulted at a future period with advantage; while a careful abstract of the papers read at the Geological Society and other bodies, touching on those sciences allied to mining, render it valuable to those who may not be classed as "adventurers" in mines, to whom the Journal is more particularly addressed. If to the latter numerous class of our readers one claim be more prominent than another, it is the honest spirit and fearless independence we have ever evinced and exercised in conducting the Journal. Ever has it been our object and determination to expose abuses when found to exist; and although we have been mulcted in more than one instance, and every step has been taken by parties implicated to prevent an exposure in our columns, we have never allowed the guilty to escape.

In the performance of our duties there is much that is calculated to afford a pleasing satisfaction, in being able to present to our readers material of a useful and instructive nature, in the original papers or extracts from works of science, which appear in our columns—the reports of the proceedings at meetings of public companies—the correspondence from mining districts—original communications on practical subjects, with general information pertaining to mines, railways, banks, and other associations, which come under the designation of Joint-Stock Companies, at once rendering it a useful and important medium for promulgating knowledge, as well as for the insertion of advertisements immediately connected with the pursuits to which the Journal is more immediately directed.

It is our wish on all occasions to avail of the suggestions of friends, and such other means as may present themselves, calculated to improve the Journal, and thus to evince our desire to comprehend and meet the wishes of our Subscribers; and in directing attention to the ALTERATION in the last page, we feel assured it will be admitted we have gone far to accomplish that object—the impossibility of rendering the real prices of shares in many of the undertakings being alone a sufficient reason, while the arrangement and increased information acquired will, we trust, be deemed satisfactory by our readers.

It may also be observed, that, in addition to our notices of New Companies, we purpose inserting, under the head of "Mining Notices," all such paragraphs as may appear in the London or provincial journals, without, however, being responsible for their authenticity.

The Supplement to the MINING JOURNAL has fully maintained its character, and the papers "On the Iron Trade" have been received as might be calculated upon from the interest attached to them—embodying much information on the subject, and embracing many valuable statistics. The closing chapters, up to the present period, with the position of the trade, and deductions arising therefrom, will appear in an early Number, thus completing the Volume, which may be then bound in a separate form.

The alterations proposed in the Journal will, in a great measure, supersede the publication of a Monthly Supplement, and, therefore, it is the intention to issue Supplements only as occasion may require, without pledging ourselves to the regularity of publication. The MINING REVIEW will, in such case, be confined, as was originally intended, to Original Papers and Reviews—amongst the former of which, the completion of the series on the Iron Trade will appear.

It is with much satisfaction we are enabled, on authority, to state, that the "Miners' Smelting Company" have, by the arrangements entered into, become a Corporate body, having possessed themselves of the Charter of 1691, granted to the "Governor and Company of Copper Miners in England;" and, further, secured the interest and property enjoyed by the "English Copper Company," which thus gives the establishment increased strength, as, in addition to the works at Cwm Avon and the Forrest Works, they will now employ those held by the "English Copper Company" at Llanelli, and thus be enabled, without further outlay or delay in the erection of buildings, &c., to considerably increase their "make." It is hardly necessary for us to observe, that the object of the company is that of co-operation with the miners, and to create one uniform interest as affects our tin and copper mines—abolishing the system of "middle men" (a term well understood in Ireland at least), and giving to the miner the fair value for his ore, subjected alone to the actual smelting charges and commission on the sale of his produce, while money is advanced to him in the interim, in the same manner as is now done to the tinner, the residue being subsequently accounted for and paid over to him on making up of the quarterly or half-yearly accounts.

The Miners' Company thus being protected by a charter, the several objections which might be raised as to the responsibility of parties, and the difficulties which we know to attend joint stock companies where the shares are held as scrip, or not regulated by Act of Parliament, Charter, or a well-defined Deed of Settlement, may be said no longer to exist. We are further glad to learn, that a fortnight will not elapse ere we may contemplate announcing to the mining interest the names of the highly respectable parties associated as governor, deputy-governor, and council of administration, of the Miners' Company. By the charter acquired, and under which the company is now established, the privileges extend over England, Wales, and Ireland, with power to raise, from time to time, such capital as may be deemed necessary, thus not only limiting the responsibility of the proprietors, but giving to the public a security that the capital put forth is not merely nominal, nor is it confined, the terms of the charter requiring that the amount of shares issued from time to time shall be paid up at spe-

cified periods. By this arrangement, the company will further acquire the smelting works and rolling mills and machinery belonging to the establishment at Llanelli, and on the banks of the Thames, as well as the warehouses and establishment of the company in London.

It will be observed, in our columns of to-day, that a University is projected at Newcastle, one department of which will be devoted to a School of Mines, and, we believe, with every prospect of success—thus establishing one of the branch schools which we would have projected as arising out of a Central or National School of Mines. The observations which fell from Mr. GREENHOW are well deserving of attentive perusal, and we augur, had Sir C. LEMON pursued the same course, he would not have been foiled in his attempt. The mining interest is, however, greatly indebted to the honourable Baronet, for we have reason to know, but for his exertions, and the articles which have appeared in the MINING JOURNAL, the project, as regards the Newcastle University, would not have been received with the favour which we are glad to find awarded it.

We have not, for some time, had occasion to notice the operations of the "British Iron Company," nor to advert to the cause of "ATTWOOD & SMALL," which had, we believed, gone to "the tomb of the Capulets;" but the announcement of a meeting, to be held this day, "to receive and consider the report of a committee appointed to investigate a case for the relief of the shareholders," has excited our attention, and will, doubtless, awaken that of the proprietary at large. We do not propose, on the present occasion, making any observation on the objects of the meeting, as we shall endeavour, in our next, to give not only a report of the proceedings, but the report of the committee and the resolutions adopted; in the meantime, however, we cannot do otherwise than express our regret that any subject should arise, forming a question of discussion, which may involve the necessity of employing the gentlemen of the long robe. Surely the proprietors have paid dearly enough for this; and although we consider the directors were bound to raise the question—we must say that prudence, both on their part and that of Mr. ATTWOOD, would have saved many thousands of pounds, and years of bitter anxiety and care. Upwards of a million of money has been expended on a property which, at the market price, is almost valueless, and yet we find that fresh questions, of a legal nature, are likely to arise. That the company is most unfortunate, cannot be denied, and that the directors are highly honourable, will, we believe, be readily admitted; we trust, therefore, that no hasty resolve will be determined upon, and in case a deputation should be appointed to meet the board, that one feeling will animate all parties—the desire alone of promoting the interests of the company.

It will be observed, on reference to our columns, that a highly respectable and influential meeting of gentlemen connected with Norwich and the immediate line between that city and the junction with the Northern and Eastern Railway, was held on Wednesday last, when several resolutions were passed, with an unanimity of feeling which augurs well for the success of the projected measure. The report which we have given of the proceedings will best demonstrate the interest which the question has excited among those immediately connected with the districts through which the line is proposed to pass, and while we regret the aspersions thrown on the Eastern Counties Railway Company, we must admire the prudential caution observed by many of those who took part in the proceedings, making it a *sise qua non* not only to ensure the support of the monied interest, but the ultimate success of the measure, that the principle on which they started was "to begin at both ends." This is business like, and, in a great degree, ensures the accomplishment of the object; the Norwich folks, we find, are "wide awake," and we trust, now that they have "stirred from their slumbers," we may not have occasion to charge them with "sleeping on their post." With the promised support of the landholders and capitalists, and the promising report of the engineer, we see no reason why the line should not yield a fair return, if not a large revenue, upon the capital employed, more especially as the company will have the advantage of forming a junction with the Northern and Eastern line of railway, and thus establish a direct communication with the metropolis.

CURIOS COINCIDENCE IN ANCIENT AND MODERN HISTORY.—The following rude translation, from an old manuscript work, entitled *Reveli*, tome VII. p. 174, *et seq.*, A.D. 1691, has been furnished as by a correspondent, as having some application to movements of the present day:—

"It was after many years, during which the tribe of the Myndus had been subjected to the invasion of a small but powerful neighbouring tribe, located across the waters, and known as the Smello-Merces, that a stranger from Angloria visited the lands of Cornubia, and there discovered the inhabitants principally employed in holes or burrows, designated 'hals,' from which they extracted certain divers metallic products, which they bartered for certain coin in the Smello-Merces, whose case, made of timber, traversed the waters, and carried away the produce of the burrows so acquired by the Myndus. The want of information in those times was such, that the products so obtained were at an after period, by means of a fuel termed coal, brought into a state of fusion, and then again bartered at a high price. This state of things having come to the knowledge of the Anglorian, he at once resolved on forming a party of enterprise, with the object of relieving the tribe of Myndus, and having held a council with several of the primitive chiefs, at once determined on bringing the tribe of the Smello-Merces into the field. Tomahawks, Wye Gurs, Low Gurs, and Battens, with several independent chiefs, including James and Ben's Sons, were called into action, and it was agreed that this a mischief would arise thereof. Many of the chiefs, however, among whom were Carn Brea and others, noted in those times for independence of character, refused on securing forts at Cwm Avon, the Forrest, and Llanelli, although distant from their huts, and the 'hals,' with which they were so closely connected, which they accordingly acquired, even in the very centre of the lands on which the Smello Merces had pitched their tents. This bold measure at once ensured to them the rights of which they had so long been deprived—no longer did the Smello-Merces invade the Myndus, but finding they had acquired power, several and many of them, however, would not trust to the tribe who had profited at their cost, and joined the chief who had established themselves in the principality, and thus gave a power which, at the time of writing, was likely not only to be maintained, but to be increased."

EXPORTATION OF THE PRECIOUS METALS.—The exportation of the precious metals from the port of London to foreign ports for the week ending the 24th ult., was as follows:—Silver coin to Belgium, 2000 oz.; Mauritius, 4000 oz.

MINE ACCIDENTS.—On Tuesday last, as several men were in the boiler-house of Balaeswddon Mine, changing their clothes to go underground, a large tin can, containing 8 lbs. or 10 lbs. of gunpowder, exploded with a dreadful crash, carried away part of the roof of the boiler house, and dreadfully scalded seven of the poor fellows who were present, some of whom were obliged to be conveyed to their houses in carts, with very little hope of recovery.—On the afternoon of Tuesday week, John Cott, of Brighton, collier, accidentally fell into a coal-pit, at the Swallow Nest, and was killed instantly.

ORIGINAL CORRESPONDENCE.

CERTAIN METHOD OF ASSAYING COPPER BY ELECTRO-CHEMICAL ACTION.

TO THE EDITOR OF THE MINING JOURNAL.

Sir.—As the tide of knowledge is spreading fast, and improvements are taking place in almost every branch, I am induced to push my little bark into the stream, that those who will may take advantage of that which I have practised (alone, I believe) since January, 1838. The subject of assaying has occupied a portion of your Journal lately, and remarks have been made on it by those who have taken up the subject of Sir Charles Lemon's school; and in an able paper, by Mr. Pridoux, he alludes to it, and also to electro-chemistry. My object will be to show that the application of this science may be made available to the student, old or young, in analysis, and by which he may become master of "the art of knowing the per centage of copper" in any of its ores. I remember the day (I believe it still exists in some places) when the door of the assay-office was as closely "tilted" as that of a freemason's lodge, and none but the initiated could be permitted to know the "mysteries of the art"—it was even as profound as the "mystery of the standard." But I will proceed to show that a perfect mode of knowing the quantity of copper in any ore is feasible, and, further on, I will demonstrate it, by the atomic system, to the satisfaction (I think) of every one. The process may require a little more time than "the dry way," but not more labour; and I feel satisfied I could instruct a person (one of ordinary capacity, but not with hands like the feet of an elephant) in from three to six days to give the per centage of an ore as surely (if not more so) as any assayer. It is but just to say, I am indebted for the first idea on the subject to Mr. Martin Roberts, when I visited Cwm Avon Works, in 1837; from that period I have tried hundreds of experiments, and devoted much time and labour to the object, so as to bring it to its present state. I began to assay (if I may apply the term) by electro-chemical action in January, 1838—then the precipitation of the copper required four or five, or even more, days (I then used platinum), whilst now it seldom requires more hours—sometimes less—and this time may be shortened, and also the solution of the ore, and I shall be glad to hear that it has been done.

Process.—A given weight of the ore (as prepared for assaying by the dry way) is dissolved in an acid (*aqua regia* is the best), evaporated nearly to dryness; redissolved in water, filtered, and then treated as the copper solution, I shall describe a little further on. I may remark, I have precipitated the copper on gold and platinum, and adopted various forms, particularly the helix, which I used more than two years, but I find copper cylinders answer better, and there is little trouble in cleaning them, compared with the more precious metals. I feel warranted in saying I have tried hundreds of samples, and have never been deceived by the process—that cannot err; but error may arise from not having a perfect solution, and in the manipulation of the ore, before it is subject to the electro-chemical action.

Now for the demonstration, and which is a beautiful proof of the correctness of the atomic theory:—Take 250 grs. of the crystallized bisulphate of copper (or, half the quantity), which contains 64 grs. exactly of pure copper, dissolve it perfectly, add two or three drops of acid, and place it in an unglazed earthen pot, which will hold three fluid ounces; place this in another somewhat larger, glazed, in which there is a weak solution of hydro-chloric acid; introduce a copper cylinder (to which a wire is soldered, and whose exact weight is known) in the copper water, and an iron cylinder (with a wire attached in the same manner) in the outer vessel of acid and water; amalgamate the ends of the wires with nitrate of mercury, and connect them in a cup of the same metal, or in any way, so that they are in perfect contact. As soon as the circuit is perfected the operation will commence (and which may be known by a slight hissing sound), and will not cease until all the copper is precipitated on the copper cylinder, and which may be effected in the space of from ten to twelve hours; then take out the cylinder, dip it in water, dry and weigh it—its increase in weight will be the per centage of the copper, and, in this case (for half the quantity), it will be 32 grs. heavier than it was before.* The operation, when completed, can be known by taking one drop out of the solution and placing it on pure gold, or platinum, and touching it with a zinc rod—if no copper be precipitated on the gold, the solution will be free from copper. Thus, then, may every one interested in the produce of copper know the exact per centage of an ore, according to the sample. So beautiful and perfect is this system, that one might swear (not speaking profanely) to the produce of a sample, provided all the previous operations were performed with accuracy. By the dry assay there is considerable loss, and which I have proved by "check samples," on many occasions varying from $\frac{1}{2}$ to $\frac{1}{4}$ per cent., and yet the miner must sell by the dry assay; and any one connected with the sale of ore knows (especially in those of low produce) what a difference one-half per cent. makes in the price.† Should this loss, in the dry way, be doubted, get some old pots from an assay-office, and test them, or try the slags after the "prill" of copper has been extracted—in both, copper can be traced. A word on these Cornish pots (although the best of crucibles for certain purposes)—they are greater robbers of the miner, from their roughness, than ever the furnace is to the smelter. The former loses all that is absorbed—the latter gets it when the furnace floor or hearth is broken up; and as to volatilisation, more is carried up the assay-office chimney (in proportion) than ever ascended through a furnace stack. In your Journal of the 14th November, you have a letter from "A Miner," dated London, in which he speaks of an important discovery made by "Williams, Foster, and Co.," in extracting more metal from their ores than other smelters can effect, and which is supposed to be occasioned by the absorption which takes place in the assay-office trials; for, if the dry assay was not in favour of the smelter, how could they make a surplus of from 8 to 14 per cent.?

I think I have shown that a perfect mode of assay can be effected, and let no one doubt of success—cleanliness and accuracy are required in both plans—but, in the dry way, much labour (and hot work too), practice, and experience are necessary to know "fine copper;" but, by the process I advocate, the copper, by an unerring law, is made fine, and requires neither judgment or practice at all, and yet must be correct. I will conclude with but one remark, which is, that I really do not see why, in buying and selling, there should not be the most perfect understanding as to the value and quantity of the thing bought or sold; and as this rule is admitted to be just in other matters, would it not be so also in the sale of copper ore?

I am, Sir, your obedient servant,

Tremadoc, near Carnarvon, Dec. 28. R. W. BYERS, F.L.S.

[We forbear making any comment on the communication of our correspondent, as the subject will, doubtless, be treated on fully by those who are more intimately acquainted with the details than we can be expected.]

THE MINERS' SMELTING COMPANY.

TO THE EDITOR OF THE MINING JOURNAL.

"Great evil has arisen to individuals and communities from allowing fallacies and falsehoods to pass uncontredicted in those channels through which they are conveyed to the public mind."—Southey.

Sir,—Really you seem to be a little unreasonable in expecting any reply to the malignant sneers of your Illigian correspondent—or rather, as you more properly designate him, a copper smelter—for beyond what is thus clumsy meant to be so very severe, there is nothing worthy of attention. You will notice, however, with what amiable candour he has prefaced the above quotation from Southey, and how consistently he has insinuated that the Miners' Smelting Company is treacherously based on "the principle laid down by the innovators, that the profits on the copper smelting trade are exorbitantly large," whilst he cannot but know, that it proceeds from the miners themselves, in their own defence, and in order to get rid of the complicated and expensive machinery now employed in conveying their products to market—precisely on the same principle as modern steam-engines, with all their various and beautiful improvements, are preferred to the cumbersome and ungainly erections of the last century.

The only clever hit of this copper smelter, in disguise, is the admission that Messrs. Vigners and Co. have had the precaution to build their boat

* Whilst preparing this letter, I placed 12 grs. of sulphate of copper in my assay-rat, in ten and a half hours, it was finished, the cylinder weighed 40 grs., and when reweighed 31.8—11.8 having lost $\frac{1}{2}$ of a grain. I examined the last copper liquor by gold and zinc, but not a trace of copper. I added liquid ammonia, which threw down precipitate of iron, and which, when estimated, would be equivalent to the weight wanting; therefore should any of your readers try this experiment, the crystals of copper should be examined, that no minute crystals of sulphate of iron be attached to them, otherwise it will lead to error.

† At the sale at Swansea, on the 9th Dec., last, in two parcels of ore from Bally-moragh, the difference in price between £2 and £1— $\frac{1}{2}$ —as per ton.

sufficiently large to accommodate as many friends as may be disposed to embark with them on so pleasant and so promising a voyage. But I forget—there is certainly another hit equally clever and surprising, for, in his simplicity, he admits, with admirable naïveté, that he foresaw does not at all object to the formation of another copper company—amusing, very! as if the Miners' Company differed from those already in existence, other than in the greater simplicity and more just proportion of its superstructure, and in the greater depth and more massive solidity of its foundation.

I am, Sir, your obedient servant,

ONE OF THE INNOVATORS.

[As our correspondent cites the quotation of "A Mine Adventurer," we may be allowed to quote him. "One of the Innovators" observes, that the establishment of a Miners' Smelting Company "proceeds from the miners themselves in their own defence, and, in order to get rid of the complicated and expensive machinery now employed in conveying their products to market." This fact is so notorious, that it affords convincing evidence of the opinion entertained by the miners and mine adventurers, that at least there is a "something rotten in the state;" and hence the innovation or conservative reform which is being brought about. There can be no doubt but that the Miners' Smelting Company must withdraw from the other houses a certain quantity of their ores, and must also be competitors in the market for the cake or sheet copper, but we believe it was never intended or thought of driving the body of smelters out of the field—the main feature in the establishment being to afford to the miner facilities and opportunities of obtaining the full value of his ore by selling it in the state of metal. This accomplished, it is not compulsory on the miner to render his ore to the Miners' Company, but he has still the opportunity of going to public ticketing. The Cornish motto—"One and all," should, however, be illustrated in the support afforded to those who have, at much labour and cost, enabled the miner and mine adventurer thus to be independent of the smelter.]

MINING IN IRELAND, AND REPEAL OF THE UNION.

TO THE EDITOR OF THE MINING JOURNAL.

Sir.—It is with much surprise, that, on perusing the *Pilot* of this evening, I found the name of one of our principal officers (a gentleman for whom I entertain the highest respect, both as to his ability and integrity) associated with Mr. O'Connell's last link of his tail—"the repeal." I refer to the letter of Mr. J. Petherick, read at the meeting of the "Loyal National Repeal Association," held on Monday last, with his subscription, which afforded Mr. O'Connell opportunity to laud to the skies this "true friend of liberty—a plain, honest, straightforward Englishman—a rough English diamond." I do not, for one moment, wish to preclude Mr. Petherick, or our excellent secretary—or, indeed, any director or officer of the company, from the free expression of their opinion, yet I cannot but think, in the peculiar position in which Mr. Petherick is placed, paying away, as he says, 2400*l.* a week, which should represent the wages of no less than 3000 individuals, over whom he is manager, and who are subject to his control, that it must be manifest to our board of directors, an example of this nature being allowed to be set, is one which may have a baneful influence. I should say the same if he publicly avowed his attachment and alliance to an Orange Lodge, or any other body, for I enter not into the question. As our meeting is convened for a few days hence, I trust the directors will feel it their duty to animadvert, in their report, on this unusual course pursued by their manager, if they have not already communicated with him on the subject. I should be sorry to see our company mixed up with religious or political discussion or questions, as I feel assured it would militate much against us, while gentlemen on your side, finding that even mining enterprise cannot be carried on in Ireland without party spirit betraying itself, would naturally conclude that such course is calculated to injure the country seriously, and to affect mining enterprise. I furnish you my name and holding for your satisfaction, subscribing myself,

A SHAREHOLDER IN THE MINING COMPANY OF IRELAND.

Dublin, Wednesday Evening.

[We regret that we should be called upon to insert the letter of our correspondent, who is well known to us, more especially as the question raised is one of that delicate nature which, in a great measure, precludes us from offering any observation. We do not profess to understand the Repeal question, even did it form a subject for discussion in our columns, but, trust, in the present instance, an explanation can and will be afforded at the forthcoming meeting. If there is any country where power should not be improperly exercised it is Ireland, and as our friend, Mr. J. Petherick, is from the county of Cornwall, where the inhabitants are not wanting in shrewdness or knowledge of mankind, we are induced to hope, and further, to express our conviction, that while he avails himself of the one quality which his countrymen possess, he will appreciate the power placed in his hands, in exercising it for the benefit of his employers and those employed. As a general principle, we think it at all times better to avoid appearing as a partisan or advocate of any particular measure where a considerable difference of opinion is known to prevail, and after many years intimate intercourse with Ireland, from peer to peasant, we feel ourselves justified in saying, that honesty of intention and fair dealing is all that is required to satisfy those on the other side, and to ensure a reciprocity of feeling.]

INSTRUMENTS USED IN BLASTING.

TO THE EDITOR OF THE MINING JOURNAL.

Sir.—In the *Mining Journal* of the 19th instant, you published a letter signed J. Pridoux, in which is the following paragraph, viz.—"The ground, in 'Pod' (or 'Pool,' the word is not distinct) adit, was once so strong that our miners could not work it, until a German made borers for the men, which rendered the hole larger at the bottom than top, and thus retained the explosion, and burst the rock." As it has appeared to me, for some time, to be very desirable to make the hole, when blasting hard rocks, larger at bottom than top, it would greatly oblige me, and some other of your readers, if you, or any of your correspondents, through the medium of your paper, could give me any information how, or where, such tools or instruments could be obtained. Hoping you will excuse my thus troubling you, I am, Sir, your obedient servant,

A CONSTANT SUBSCRIBER.

[We doubt not but that Mr. Pridoux will afford to "A Constant Subscriber" the information he seeks.]

SUPERIORITY OF CORNISH STEAM-ENGINES.

TO THE EDITOR OF THE MINING JOURNAL.

Sir.—Being perfectly convinced of your zeal for the promotion of science generally, I venture to offer a few remarks on the great advantages of a Cornish steam-engine, for lifting or pumping of water, to any others which have hitherto been used in the United Kingdom. In proof of which I am convinced by witnessing this day the operation of the engine recently erected on the New Southwark Water Works, in the Battersea-fields, by Mr. W. West, and manufactured by Messrs. Harvey and Co., of Hayle Foundry, on the same principle as that erected by those gentlemen on the East London Water Works, at Old Ford, the effect of which need only be witnessed to satisfy the most scrupulous observer of its superiority, as a saving of 300*l.* per annum is thereby effected. The engine erected on the New Southwark Water Works, in the Battersea-fields, to which I have previously drawn your attention, is a 64-inch cylinder, her length of stroke is 10*1/2* ft. in the cylinder, and 10*1/2* ft. in the pump, working a 32-inch plunger pole, with the patent valves by Messrs. Harvey and West, which are so constructed, and the operation so easy, that it would be difficult to persuade a common observer of the existence of a valve therein. Should this engine prove so effectual and economical as that of the East London Water Works (to which I have before alluded), of which I have no doubt, I am quite satisfied that the opinion of every unbiased engineer would be such as to admit those engines to be far superior to any others which have hitherto been used.

I am, Sir, your most obedient servant,

AN ADMIRER OF MACHINERY.

Ginger's Hotel, Westminster, Dec. 23.

[The communications with which we have been favoured by Mr. Wicksteed, and the correspondence which has from time to time appeared in our Journal, we consider affords convincing proof of the superiority of Cornish engines; but it is hardly necessary to say that the same care must be observed in working them, and causing the cylinders, steam pipes, &c., to obtain the same results. Mr. West has been most successful at Fowey Consols, and other mines in Cornwall, as also at the East London Water Works. We are glad to find that he is becoming more generally known, but, we must say, at the same time, although we prize Mr. West, he is not the only engineer Cornwall can produce, and many are there who will not allow Mr. West to bear off the palm. Messrs. Hockings and Lomax, St. George, Runcorn, and others, might be named, but the best test is Messrs. Lea's Monthly Report, which appears in one column, whereby it will be at once seen who are held in the highest estimation, and what is the power obtained under their supervision.]

MINERS' INSTITUTES.

TO THE EDITOR OF THE MINING JOURNAL.

"For if the people die for want of knowledge, they who are set over them shall also die for want of charity."

Sir.—Having in former letters stated that labour education was equally necessary with literary education to make an intelligent miner, I now beg leave to show how these may be combined, and that to acquire the former does not necessarily preclude the acquirement of the latter. If it is considered one should take precedence of the other, I should say let labour education be the first, and that boys, as soon as they can read and write a little, cannot be too soon put to work, provided the labour is in proportion to their strength, and not kept too many hours at work in the day. A young man who spends his youth accustomed to task his mental powers only, would feel much greater aversion to commence manual labour than one who had worked with his hands would feel to commence study, particularly the study of the sciences connected with mining, which are by no means abstruse, and may, probably, be looked on as a source of amusement for the hours of relaxation from bodily toil. Thousands have studied in this way, and that such is not more general is because knowledge, unallied with wealth, rank, or power, is not respected, in fact, is often called useless knowledge, and is thus unpopular—public opinion follows what is honoured; honour knowledge, and you chain to it that opinion."

The occupation of the miner is sometimes disagreeable, and often dangerous; he is exposed to the vicissitudes of fearful elements, but, although such may prematurely waste the animal powers, it does not tend to cramp the intellect, but, on the contrary, often calls forth the exercise of every ingenuity and device, and learned gentlemen, who are candid enough to admit the truth, must often have witnessed with astonishment the useful expedients resorted to in cases of emergency by the uneducated (as they are called); this, I think, ought rather, however, to be used as an argument for literary education than against it.

In cities and towns much good has certainly resulted from the establishment of mechanics' institutes for the working classes, and why in all cases where established they have not been equally successful I shall not stop to inquire, but I take leave to assert, without fear of contradiction, that no class of working men has better opportunities of establishing such schools than miners—their hours of labour are rather shorter, and rates of wages, although not the highest, are, on the average, less fluctuating than most other labourers—two hours every evening could easily be found for the improvement of the mind, were it made fashionable amongst them to allot that time for this purpose. Some gentlemen may object to this, and say, why, would you not allow the poor fellows a little time to amuse themselves after their hard toil? I would reply, Yes, but let it be the amusement of the philosopher rather than that of the dancing master. A respite from bodily labour may be necessary at some time, but the mental faculties are enfeebled for want of employment, and equally require exercise, while the body requires rest; and I appeal to all those who ever had to earn their bread while they prosecuted their studies, if they did not feel a keener relish for both duties by attending to them alternately?

It may be unnecessary to propose any particular education for these evening schools (miners' institutes), as every locality will best judge what answers themselves. I would say practical arithmetic, principles of drawing, surveying, mathematics, and occasionally lectures on the physical sciences, with a well-assorted library, suited to the members. Were all the officers of any mining establishment, with the co-operation of owners, to enter heartily, and with good earnest, into the adoption of the system here alluded to, I think I could answer for the workmen following their example; and I should hope many will be found to do so who might be opposed to a tax on the community to make scholars, as they might think such was intended to break the multitude of intellectual vassalage.

Education in any shape has many opponents, there is a class of persons who appear to cut their arguments to find out how little education the miner can do with, and not as to how much he can obtain. There is another class, who are often loud in their pride about the "uneducated," talking of "the wonders of science," and the "difficulties" of study; these are generally men who have never been fully sensible of the value of mental development in themselves, and therefore cannot be expected, or wish, to forward it in others; and last, though not least, there is that numerous class, too lazy to advance themselves, and are afraid that they would endanger their own superiority, by any effort, which they think tends to the equalisation of knowledge. But, on the other hand, popular education, I believe, has many sincere and able friends, if they could be brought to act together, and to act consistently. I have mentioned the mechanics' institutes in town, as worthy of imitation; I may also notice that on the 8th of December last a meeting was held at Monkseaton (a rural district, in the neighbourhood of North Shields), for the establishment of a "literary institution" by the labouring classes, at which meeting the clergy and magistrates attended to lend their assistance—I would, therefore, say to the miner and miner's friends, "Go and do thou likewise."

I remain, Sir, your's, &c.,

A WORKMAN.

[The sensible observations of "A Workman" require no remark on our part to give them weight. We have ever been the advocates and supporters of education, more especially to the mining community, and the project of our correspondent appears feasible, more especially as our favourite notion of mining schools cannot embrace every district.]

ON MR. MARTIN'S IMPROVED BORERS AND IMPROVEMENTS IN BLASTING.

TO THE EDITOR OF THE MINING JOURNAL.

Sir.—Observing in your Journal of December 5th, a letter from Mr. Alfred Martin, of Penzance, relative to certain improvements in boring and blasting rocks, with drawings of a new set of boring instruments for mining purposes, I beg to offer my opinions on his presumed improvements, which, as a practical miner, I consider it my duty to do. Now, supposing I wanted to bore a hole in a hard "espal" end, and by way of experiment I first try his hollow bit, which has four corners; now, it is well known to miners that in a hard stone the corners of a bit are the first that begin to wear, and when borers have so many corners to them (which is the case with Mr. Martin's), it would be next to impossible to bore hard stone with them, as they would be blunted so fast.

As regards the sharp-pointed bit, that would be entirely useless in hard ground, for the resistance offered would be so great that no sharp-pointed instrument could stand it. With regard to the last-mentioned bit, there need but little to be said about it, for, if the first answered, there is no doubt but that the last would also. In my opinion there are no borers equal to those that are constantly used in the mines of Cornwall and Devon, whose size generally run from one to two inches diameter; for hard ground I like to see the bit with a slight convex curve, whilst for fair or soft ground it cannot be too straight. With the borers I have just described I would challenge them against Mr. Martin's in fair "killes" (for that is the only ground, in my opinion, which would at all suit his)—boring two feet to one—for the nature of his bit, or tip, is such that it would not bore more than one inch at the most before he would be obliged to substitute it for his other borers, whilst, with the plain miner's bit, from four to six inches could be bored without stopping, and a saving of time is effected, which is a very important consideration in underground operations.

Mr. Martin speaks of holes being bored a foot or two deeper than there is occasion, for "tamping" only; now, in my experience, I never yet saw a hole bored one inch deeper than it has been thought it would "tare," and I have bored and "tared" them from four inches to several feet deep.

In speaking of the saving of powder for mining purposes, I condemn entirely the adulteration of powder for blasting, either for making a "sink" in a shaft or "squearing" up the "cut" in an end, for the great desideratum in such cases is to lodge as much powder as possible in a given space, in the bottom of the hole. I have heard of experiments being tried—I believe, in Germany—where holes were fired with half the quantity of powder of the supposed charge, or load, and the like quantity of sand mixed with it, which had the desired effect. Now, I am of opinion, that if the same quantity of powder had been given without the sand mixed with it, which had the desired effect, but where holes are bored in con-

MINING CORRESPONDENCE.

ENGLISH MINES.

HOLMBUSH MINING COMPANY.

Dec. 28.—The lode in the 100 fathom level, west of engine-shaft, is about 1 ft. 6 in. wide, worth 25/- per fathom. In the wings below this level the lode is nine inches wide, producing good stones of ore, but not rich. In the ninety fathom level, west of Dennis's wine, the lode is 1 ft. 6 in. wide, worth 6/- per fathom. In the eighty fathom level west no alteration, ground still favourable; in this level east the lode is one foot wide, of a favourable appearance, but without ore. In the wings sinking below this the lode is about 1 ft. 6 in. wide, worth 15/- per fathom. Lode in western stopes, in back of this level, still holds good, being 2 ft. 6 in. wide, and worth 60/- per fathom. In eastern stopes the lode is 1 ft. 6 in. wide, worth 20/- per fathom. The eastern stopes, in back of the seventy fathom level, are suspended, and set on tribute. Western stopes, in ditto, lode 1 ft. 6 in. wide, worth 24/- per fathom. In the sixty fathom level south, on the lead course, the lode is eight inches wide, and unproductive. In this level east the lode is from 2 ft. to 2 ft. 6 in. wide, and still unproductive. We intend sampling to-morrow about 210 tons of good quality ore. The tribute pitches are, upon the whole, looking favourable. The sixty-two fathom level east is at present suspended, and the men are employed rising against Bray's shaft.

T. RICHARDS.

TRELEIGH CONSOLS MINING COMPANY.

Dec. 26.—We have succeeded in closing up the second parcel of our ore, making the whole as estimated 133 tons. We are looking well in the bottom level at Good Fortune, the whole extent driven is about four fathoms, the lode in each end large and ore, worth about 10/- per fathom. The twenty west on this lode continues to produce ore and leave tribute ground, it is now worth about 3/- per fathom. At Christon we have little alteration in sinking. The sixty west is very promising; the lode in the present end is three feet wide, worth 15/- to 20/- per fathom. The sixty east is not so good, though the lode is large and regular, leaving tribute ground. The fifty east is improved, the lode larger, with a leader of ore four inches wide on the north part. Other places with but little alteration.

W. SINCOCK.

TRETOIL MINING COMPANY.

Dec. 28.—Lode in engine-shaft twenty inches wide, unproductive. The lode in thirty fathom level, east of engine-shaft, nine inches wide, unproductive. Thirty Fathom Level, west of John's Shaft—Lode one foot wide, tribute ground. Twenty Fathom Level, east of William's Shaft—Lode one foot wide, very good tribute ground. Twenty Fathom Level, west of John's Shaft—Lode one foot wide, tribute ground. Ten Fathom Level, east of William's Shaft—Lode six inches wide, good tribute ground. Ten Fathom Level, west of John's Shaft—Lode small and unproductive. Cross-cut, driving towards the Mine Park Lode, at adit level, is not progressing so fast as usual, the ground being more hard than usual; we think if the lode keeps its direction and underlie we may get five or six fathoms from it. We expect our November ore will be sampled next Monday.

HENRY WILLIAMS JOHN MORCOM.

UNITED HILLS MINING COMPANY.

Dec. 29.—Adit End East—Lode three feet wide, with stones of ore, and promising appearance. Adit End West—In this end the lode is 1 ft. 6 in. wide—six inches on the south part ore. Thirty Fathom Level—The lode in this end is two feet wide—one foot on the north part ore of a fair quality. Thirty-six Fathom Level—In the western end of this level the lode is without alteration since our last. Forty Fathom Level—The lode in the eastern end of this level is 3 ft. 6 in. wide, with ore throughout, but not so good in quality as for some time past. No lode broken in western end since last reported. Stoops, east and west of Webber's Wine—The lode in the stopes, in the bottom of this level, is three feet wide, and looking very well. The lode in the back is three feet wide, ore throughout, but not so good as in the bottom. Stoops, west of Nettle's Wine—Lode in these stopes is about five feet wide—two feet good ore. Eastern Shaft—In this shaft the lode is three feet wide, and poor. Fifty Fathom Level—No lode broken in the eastern end; west end lode 4 ft. 6 in. wide, ore throughout. William's Shaft—No lode broken down in this shaft, nor will there be till the latter part of this week.

C. PENROSE. N. LANGDON. S. H. PEARCE.

GREAT WHEEL CHARLOTTE MINING COMPANY.

Dec. 28.—We beg to hand you a report of this mine. The engine-shaft is sunk to within about four feet of the proposed, or eighty-two fathom level, and we expect to complete it to that level by the end of January, when we shall immediately commence cutting a plat. The lode in the seventy-two fathom level west is about four feet wide, yielding from three to four tons of ore per fathom. In the same level east, the lode is about five feet wide, producing from two to three tons per fathom. The lode in the western wing, sinking under the sixty-two fathom level, is turning out about three tons of ore per fathom, and the one sinking further east has a lode in it from four to five feet wide, but poor. The stopes, to the west of the wine, in the bottom of the sixty-two fathom level, are yielding about three tons of ore per fathom; in the back of the same level there are a set of stopes producing about two tons of ore per fathom. The pitches throughout are rather improved, but we fear without the weather changes for the better our quantity of ore will be short of what we last sold, the amount of which will be payable on Thursday next, which is 23/1. 1s. 1d.

S. TREYTHAN. J. STEPHENS.

ROSE-DOWN MINING COMPANY.

Dec. 28.—I have again to day examined this mine, and although we have not yet cut either of the great copper lodes in the deep adit driving south, I have much pleasure in saying that the appearances of that level are of the most encouraging nature. Since my last visit (a month since) we have driven about five fathoms, in which we have intersected several branches, varying in size from two inches to one foot wide, neither of them without spots, and some of them will produce good stones of ore. Their declination is southerly, dipping towards the lode before us. The strata is congenial looking granite. No one can say how the concern will turn out, but certainly the present indications hold out great hope of favourable results. The three men working on the tin lode, I calculate will be able now to rise sufficient tin stuff, with what is already broken, to keep our stamps going for some time, but owing to such severe weather (frost and snow) it is impossible to dredge any tin work, even after it is stamped. The prospects, however, underground, on the tin lode, are favourable.

R. ROWE.

WHEAL LEEDS MINING COMPANY.

Dec. 26.—Eighty Fathom Level, west of Engine Shaft—Lode still disordered. Rise over Eighty End East—Lode 1 ft. 4 in. wide—nine inches of which good ore. Seventy Fathom Level East—Lode 1 ft. 3 in. wide, producing one and a half ton of ore per fathom. Ditto, West—Lode one foot wide, producing one ton of ore per fathom. Sixty Fathom Level East—Lode one foot wide, producing one ton of ore per fathom. Sixty Fathom Level West—Set to drive on. Fifty Fathom Level—A cross-cut set to cut the lode we are driving on in sixty fathom level; the distance at sixty fathom level between the lode is thirteen feet, and I expect at the fifty it will be about eighteen. In boring on the cross-cut south, at eighty fathom level, where the hole was eight feet deep, we cut a branch of spar, ten inches wide, but could see no mineral. I have, therefore set the end to cut this branch.

C. H. RICHARDS.

REDMOOR CONSOLIDATED MINING COMPANY.

Dec. 28.—The north engine-shaft is sunk 6 fms. 1 ft. below the forty fathom level, ground much as usual. In the forty fathom level cross cut we have this day intersected a branch or rather the character of a fissure underlying south; whether this has any connection with the main lode yet remains to be seen. In driving east, on the Great South Copper Lode, at the thirty fathom level, no improvement since my last. In driving north, on the course of the silver-lead lode, at this level, the lode is small, and at present unproductive, but in opening about twelve feet south on this lode, we find it presents a very encouraging appearance, lode from ten to twelve inches in width, good work for lead. The prospects of the pitches are much as hitherto—favourable. The rise against Hurl Down adit shaft is up 5 fm. 4 ft. 9 in. At the South mine since we intersected the east and west lode, we have not discovered the lode or branch which we had previously been driving on.

S. HARPER.

FOREIGN MINES.

BRAZILIAN COMPANY.

Cafe Branco, Oct. 3.—In the mine we have been breaking comparatively little ground on the richer parts of the lode; this, with the failing of the water power, will account for the produce having been low. The dry season is now on the break up, so I trust the stamping power in a short space of time will be considerably increased—I thus anticipate the pleasure of transmitting you some more favourable gold reports.

W. T. GRIFFITHS.

Gold return for week to 18th Sept.	lbs. oz.	dwts.	gr.
" 25th "	14	11	17
" 26th "	16	2	1
" 27th "	15	7	10
	46	9	4
Ditto for the month of September	69	8	17
	6		

AMERICA MINES.—The Spanish Government has made an offer, at the rate of 70 dollars per quintal, for four years' contract, for the silver of the Almaden Mines, which may be estimated at 17,000 quintals.

PROJECTED UNIVERSITY AT NEWCASTLE.

At an adjourned meeting of the Newcastle Town Council, on the 23d ult., a deputation from the Literary and Philosophical Society, consisting of Messrs. T. M. Greenhow, J. Fenwick, J. Watson, and the Revs. J. Pringle and D. C. Browning, attended, to solicit the support of the members of the council, in forwarding the establishment of an academic institution or college for promoting learning and science in Newcastle. Mr. Greenhow, in the course of a luminous address, said—

" There are some circumstances which render it peculiarly desirable that an academic institution, for the promotion of learning and science, should be established in this place, which I shall just shortly hint at. One of the most important of these is the extent of the large and valuable mining speculations and operations in this district—not only in the coal mines, but in lead mines. The judicious management of these require a considerable portion of scientific attainments in those who are engaged in their management. In the coal mines this is more strikingly the case, in consequence of the vast quantity of human life which is constantly in hazard, and for the protection of which all the resources of science are scarcely a sufficient safeguard. If we look back for twenty years, we shall find what lamentable accidents have occurred in the coal mines, by which hundreds of human lives have been sacrificed in a minute. Science has done much to remedy many of these dangers—to remove the sources of them—and, perhaps, to meet them with somewhat like adequate resources. But, nevertheless, although science has been largely applied in the management of these important works, it has not accomplished all; it would be within the recollection of all, that an accident had recently occurred in which many lives have been sacrificed. But if science has done so much, may we not hope, that, if we apply the most efficient remedies to all these dangers, hundreds of lives may be saved in the next ten or twenty years? But for the attainment of this end, it is necessary that science should have a seat wherein she may be cultivated with success in the very heart of the district where all these dangers occur. It is not only as regards the hazards to which life is exposed, but the hazards to which capital is exposed, for none of these accidents can occur without a large sacrifice of capital, as well as of human life. This district offers another remarkable feature which seems to call especially for the establishment of a school of science. In the neighbourhood, vast and important works have been established of a chemical character, wherein science again is required for the successful carrying on of such works—wherein large capitals are invested—wherein large numbers of labourers are employed; and it is most important that all these works should be conducted in a way which will render their management economical and safe, and, in a commercial point of view, most successful. It seems particularly important, then, in reference to these chemical manufactures, and to the mining concerns which are carried on to such an extraordinary extent in the district of which Newcastle is the centre, that a school of science, calculated to educate those who are to be engaged in the management of such concerns, in a manner to fit them for performing, in a most efficient manner, the important duties which are involved in such management. It seems, therefore, a very remarkable circumstance that those who are more immediately connected with these concerns—those whose capital, whose responsibility, is largely engaged in them—should not hitherto have exerted themselves for the purpose of establishing such a school of science as I have spoken of—that there should not have been a school calculated thoroughly to teach every branch of science, mechanical and natural, which is likely to fit youths for engaging in the management of coal mines. The coalowners of the district are a numerous and very wealthy class, and if they were to come forward in a liberal and handsome manner—if they were to see the importance of the object, and exert themselves in its promotion, there cannot be a doubt that a most efficient and valuable school for mining engineers, to which might be added civil engineers, chemical manufacturers, and all those who require a sort of professional education for such purposes, might be carried on with the greatest possible success."

At the conclusion of Mr. Greenhow's appeal, the mayor said he most cordially agreed with the speaker, and promised that the council would take the matter into their most favourable consideration.

EARTHQUAKE IN ARMENIA—SCIENTIFIC COMMISSION.

At a late sitting of the Academy of Sciences at St. Petersburg, Professor Parrot delivered the following address:—"The late fall of a considerable part of Mount Ararat is an event of such importance in the natural history of the earth, that I think it right to invite the especial attention of the academy to it; and the more so, as the different accounts that have reached us respecting this dreadful phenomenon are very confused, and are at variance with each other. In ancient times, perhaps anterior to all history, a similar fall must have taken place. This is proved by an immense cavern, on the north-north-east side of the mountain, which is called by the inhabitants the 'Dark Cavern'; it begins above, in the regions of eternal snow, and extends downwards to the depth of 800 toises; the circumference must exceed 600 toises. The whole of the interior of this cavern presents almost perpendicular, uneven, and rent surfaces of lava, which give evidence of the operation of a prodigious power. The recent phenomenon seems to have been of a similar nature, but on a larger scale. An accurate examination will certainly procure us important information respecting the nature of volcanoes. The late catastrophe may, perhaps, allow the observer to examine this ancient volcano in its inmost recesses, or at least as far as the channel through which the masses of lava, which give evidence of the operation of a prodigious power. The recent phenomenon seems to have been of a similar nature, but on a larger scale. An accurate examination will certainly procure us important information respecting the nature of volcanoes. 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MINING NOTICES.

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New Coal-Pits.—We understand that A. W. Hillary, Esq., of Ewanrigg Hall, is about to open a new colliery in his Dearham Low Fields. From its proximity to the Maryport and Carlisle Railway, and the coal being brought by a bearmouth entrance, by which the coal is brought direct out without the aid of any expensive machinery, it bids fair to be a profitable concern to the spirited proprietor, and alike conducive to the advantage of the shipping of the port, and the railway company.—It is also rumoured that the extensive and valuable coal-field on Dearham Hall estate, and belonging to F. L. B. Dykes, Esq., which has been advertised for some time, and has excited considerable competition among the coal proprietors in the neighbourhood, is now let to Messrs. John Wood (of Maryport), John Steel, and John Hodgkinson (of Cockermouth), and preparations will soon be made to work the concern on an extensive scale. This also lies in the immediate vicinity of the railway, and we have no doubt but the spirited lessors will lose no time in availing themselves of their valuable speculation.—*Whitethorn Herald.*

WOODHEAD LEAD MINES, CUMBRIA.—Operations continue to go on at these mines most prosperously. About 100 operatives, including men, women, and boys, are employed, and the make of lead averages about seventeen bars of ten and a half stones each per day. Not long since the make was much larger, being from twenty-five to thirty-five bars. The falling off which has occurred has arisen from the inferior quality of the ore, but as it is again exhibiting indications of peculiar richness, and of greater abundance, it is anticipated that the make will, in the course of a short time, equal, if not exceed, what it ever has been. The boys and women are employed in breaking the ore with hammers, and earn upon an average from 1s. to 1s. 3d. per day. The ore, after undergoing the operations already named, is put through riddles by labourers, whose wages are from 12s. to 14s. each per week. It is afterwards conveyed to what is technically termed the "smelt mill," where it is smelted into lead, and the smelters each earn 18s. per week, with free house and fuel. The miners are paid a certain rate per fathom, their earnings being from 18s. per week and upwards, and they work only six hours out of the twenty-four. The miners' labourers, who work two "shifts" per day, are also paid so much per fathom, and earn from 12s. to 14s. per week.

—*Journal of Commerce.*

COMBARTIN MINES.—The beautiful little steam whim-engine, on a new construction, by Mr. Sims, of Chacewater, is completed, and has been set to work, in the presence of the directors and many shareholders.—*Cornwall Gazette.*

IRON MANUFACTURE OF FRANCE AND ENGLAND.

There is no branch of English manufacture which seems to excite so much jealousy on the continent, and in which their inferiority is so generally admitted, as iron manufactures and machinery. The great capital required to establish an iron foundry and works on the large scale which is best adapted for producing the iron economically, renders it difficult, even were other circumstances the same, for the continental manufacturer to enter into competition with the English iron, either as to quality or price. In a French publication, *L'Acad.*, devoted more particularly to metallurgy, this subject is often mooted, and plans are from time to time proposed with a view to remedy the defects of the manufacture of iron in France, and to place it on an equality with that of England. It is true that in some respects France possesses the advantage over this country. Her extensive forests furnish an almost inexhaustible supply of charcoal at a moderate price, and enable the founders to work in that respect with a fuel better suited to the manufacture of the best iron than mineral coal. The foreign founders, however, have for the most part blindly followed the process adopted in this country, as far as they were able, and have used coal, though charcoal, which would have suited their purpose better, is abundant, and in many places cheaper. They are now beginning to take a more enlarged view of their own capabilities, and several able writers have endeavoured to arouse the attention of the iron masters of France and Belgium to the improvements that might be effected in their manufacture of iron, by availing themselves properly of their own resources—by adapting their processes of manufacture to their peculiar circumstances—and by not following the track of those who are working in some respects to greater disadvantage than themselves.

In this view a paper, written by M. Deniset, sen., mechanical engineer, has been published in the *Acad.*, for the purpose of showing, that by adopting the mixed process of manufacture, by hammering and rolling the iron as it comes from the furnace, similar advantages may be gained to those acquired by the rolling alone, which process, to be carried into effectual operation, requires extensive machinery and large steam power; which can be obtained only by a few of the iron masters in France. It is well known, he observes, that the more iron is rolled, beaten, and stretched, it becomes more soft, strong, and homogeneous, and is in consequence less brittle. The English putting into practice this well-known truth in their modern metallurgical operations, after the puddling process, stretch it out under compressing cylinders. They then cut the bars into short lengths—make with these lengths bundles placed one on another—weld them together in the reverberatory furnace—and again draw it out under the powerful cylinders. Thus the bars of the ordinary size are made from twenty-five to fifty times the length of their first form, by which means the superior quality of the rolled iron in toughness and uniformity of grain is obtained. Those works where the iron is thus rolled require large capitals for their construction, for their working, and for the attainment of perfection in the manufacture. It is also well known that those foundries only which work on a large scale are profitable. It is necessary, therefore, in order to work the large cylinders, that there should be either a powerful fall of water, or a large steam-engine. The first kind of motive power is scarce—the second is expensive. We are led, therefore, to inquire, whether by the mixed method, such as it exists in our country, it would be possible to work with water power, to dispense with steam-engines, and yet to produce iron of a quality equal to that of the rolled bar-iron.

"We think this result may be obtained by employing much smaller capital than is required for the rolling works. One pair of rolling cylinders would be sufficient, which would stretch the iron into thick bars. These bars might be cut into short lengths, which might be placed upon one another, to be reheated in the ordinary furnaces. They would then be welded into one mass, and be passed, whilst still heated, under the hammers usually employed, to be stretched into bars; that would be of a far superior quality to the iron obtained by the method in present use. The iron thus made could be warranted of a good quality, and as the hammered iron is for the most part intended to be worked up into various utensils, there is no necessity for the bars being exactly of the same size throughout. In short, this latter property cannot be obtained in the present method of hammering. Our plan would then produce bars of better quality, it would diminish the quantity of time and fuel, with an increase in the amount of iron, and a decrease of the general cost.

"If the bars were required to be exactly of the same size, they might easily be heated to a low red heat throughout their whole extent, by the heat which escapes from the furnace, and then passed through grooves in a pair of cylinders, which might be put in motion by the wheel which works one of the hammers. Thus with two pairs of cylinders put in action for a few minutes in a day only, the mixed forces on the Marmite might be converted at a trifling expense into English forces, and would produce iron as good as that of England without addition to the expenses at present required."

These are the principal recommendations proposed in the *Acad.*, but it is admitted by the writer, that unless there is a great alteration in the construction of the furnaces for smelting iron, the improvement effected in the subsequent processes cannot place it on an equality with iron of English manufacture.

IMPORTANT QUARRY CASE.

In the month of August last, a case of great importance, relating to the due and proper working of limestone quarries, was submitted to arbitration. The quarry in question is situated in the parish of North Tawton, about five miles from Okehampton, in the county of Devon; and a dispute having arisen between the lessors and the lessees as to whether it was properly worked, the lessors, Henry Hugh House (the banker) and Thos. Palmer Ackland, Esq., commenced an action against Mr. Watts and the other occupiers of the quarry. A great number of witnesses were twice taken to Exeter, and the case was then referred to John Alexander Kinglake, Esq., before whom, during nine days, it was very ably conducted on the part of the plaintiffs by Mr. Kekewich and Mr. Greenwood, and for the defendants by Mr. Cockburn and Mr. Montague Smith—the plaintiffs contending that certain large masses of rock in the body of the quarry, known technically as "black beds," in which there is very little limestone, and that, generally, of a very inferior quality, should have been removed along with the good limestone. The defendants, *per contra*, contended that all they were bound to do was so to work the quarry as to leave no masses of rock in the way of an effectual working—following, in fact, the good stone, and leaving that which would not yield a profit where Nature had placed it. In support of this view of the case, there were a great many witnesses called to prove that such was the custom of working the neighbouring quarries—most of which were modelled and exhibited to the arbitrator; while, for the plaintiffs, it was contended that the custom of working this quarry—and which was to be the defendants' rule—was to clear all away, whether it would pay for working or not. At the close of the evidence and arguments on both sides, the arbitrator postponed his award, which has now just been published. The plaintiffs have all the matters in dispute decided against them. The arbitrator directs a verdict to be entered for the defendants, on all the issues, as to the mode of working the quarry, and that plaintiffs shall also pay the defendants their costs in the Chancery suit and reference. By the terms of the reference, the costs of the common lawsuit were to follow the verdict, so that defendants will thus have their costs in this as well. The case for the defendants, which was exceedingly heavy, was most ably and zealously conducted by Mr. Hawkes, solicitor, of Okehampton, and its result has been very anxiously looked forward to by all the occupiers of quarries in the lime districts.

THE ADVANTAGES OF WORKING STEAM-ENGINES EXPANSIVELY.

The great saving of steam power in working steam-engines expansively, instead of employing steam of the same elastic force as that in the boiler through the whole stroke, has long been acknowledged, yet the principle is far from being generally adopted. That method of working has hitherto been, for the most part, limited to condensing engines, and even in these to a very small extent; though it is equally applicable to engines without condensers, and presents many peculiar advantages, in addition to the saving of power.

We recently quoted from the *Transactions of the Institute of Civil Engineers* an abstract of a paper by Mr. Josiah Parkes, in which he stated the work done by Cornish engines to be so much greater than the ordinarily estimated duty of the steam used, that he was induced to seek for other causes than the elastic force of steam alone, to account for such an amount of work being performed. He was induced to attribute the effect to the impulsive, or, as he terms it, the "percussive" force of steam rushing into the cylinder. We have, in a preceding Number, stated the reasons which induce us to conclude that no additional power can be gained by the impulse of steam rushing into the cylinders, and that the cause of the effect must be sought elsewhere. We shall now endeavour to show that, in the action of steam-engines worked expansively, there must be a great saving of steam power, which is fully adequate to account for the additional quantity of work done, without looking further for the cause than the elastic force of steam.

Let us suppose the cylinder of the steam-engine to be of such diameter that the area of the piston presented to the action of the steam is equal to 1000 square inches; and that the pressure of the steam in the boiler is 20 lbs. to the square inch. We will suppose the condensation to produce a uniform partial vacuum of ten inches of mercury. In such circumstances, the pressure acting on the piston will be 30 lbs. to the square inch—that is, 20 lbs. for the elastic force of the steam greater than the pressure of the atmosphere, and 10 lbs. per inch gained by working with a partial vacuum, on the other side the piston, of only ten inches of mercury, which is equivalent to another 10 lbs. of pressure. The total working pressure on the piston would, therefore, be 30,000 lbs. We will suppose the stroke of the piston to be four feet; and consider, in the first place, the quantity of steam used, and the amount of acting force when the full pressure steam is employed. To raise the piston one foot would require about seven cubic feet of steam, consequently, to complete the single stroke, there would be required four times that quantity, or twenty-eight cubic feet. The total acting force on the piston would be equal to 30,000,000 lbs. raised four feet. When the ejection valve is opened, the whole of the acting force of this high-pressure steam rushes into the condenser, and is wasted, and when the engine is worked rapidly, the steam cannot be condensed sufficiently to keep up the vacuum on the other side the piston. We have thus twenty-eight cubic feet of steam, which is capable of doing a vast quantity of work, absolutely worse than wasted, for its elastic force is partially acting against the return stroke. Now, instead of allowing the steam to enter the cylinder to the completion of the stroke, we will suppose that the supply is cut off, by shutting the valve, when only half the stroke is completed. The quantity of steam employed will then be only half, but we shall find that the amount of force exerted on the piston will be not very far short of what it was when double the quantity of steam was used. The steam admitted will continue to expand—so long as the resistance is less on the other side the piston—just the same whether it be in direct communication with the boiler, or not. The force will, it is true, be gradually diminishing as the steam expands, and when the piston has arrived at the top of the cylinder, the pressure will be diminished one half, though it continues still to be acting with the same advantage gained by the partial vacuum from the condensation on the other side the piston. For instance, the direct pressure of the steam, as compared with the pressure of the atmosphere, would, at the end of the stroke, be 10 lbs. on the square inch, and as the vacuum of ten inches of mercury would give the advantage of another 10 lbs., the force acting on the piston, at the end of the stroke, would be 30 lbs. on the square inch. But this would be the minimum amount of pressure. To ascertain the average pressure on the piston during the two last feet of the stroke, after the steam is cut off, we must take the amount of pressure at the end of the first foot. That pressure would be 15 lbs. to the square inch, which, added to the gain by the vacuum, would give an average force of 25 lbs. to the square inch after the steam has been cut off—that is to say, there would be a total acting force on the piston of 25,000 lbs. for two feet, easily saved by working the steam expansively.

When worked with full pressure steam throughout the whole stroke of four feet, it was shown that 30,000 lbs. were raised four feet by a consumption of twenty-eight cubic feet of steam. When worked expansively the total weight raised would be 30,000 lbs. lifted two feet, and 25,000 lbs. two feet, equal to 27,500 lbs. raised four feet, with only half the quantity of steam. Thus we perceive what an immense saving of steam power must result from this mode of working the engine; and that the ordinary calculation of duty of any given quantity of steam, will not apply when it is thus made to do double work.

Supposing the steam to be cut off at quarter stroke instead of at half, in the same engine, the advantage would be still greater. The expansive force of the steam at the end of the stroke would, indeed, be reduced from 30 lbs. on the square inch to 5 lbs., but it would be acting against the same partial vacuum on the other side the piston, so as to produce, even at the termination of its action, a combined pressure of 15 lbs. on the square inch. The average pressure in the piston during the three feet after the steam was cut off, would be about 8 lbs. to the square inch, and 10 lbs. for the vacuum—being together equivalent to a pressure of 18 lbs. on the square inch, or 18,000 lbs. on the whole area of the piston. The work done by the full pressure steam admitted during the first foot the piston was lifted would be to raise, or to overcome the resistance of, 30,000 lbs. for one foot; the work afterwards performed by the expanded steam (which would, in the ordinary mode of working, be entirely lost) is to raise 18,000 lbs. for three feet.

The total amount of work done in the three cases we have supposed is, therefore, as follows:—When the engine is worked with full pressure steam throughout the whole stroke, twenty-eight cubic feet of steam would raise 30,000 lbs. for four feet, which is rather more than 1000 lbs. raised four feet by one cubic foot of steam. When the steam is cut off at half stroke, half the quantity of steam of the same density would raise 27,500 lbs. the same height. And when cut off at quarter stroke, seven cubic feet of steam would raise 21,000 lbs. for four feet—which is 3000 lbs. raised four feet by one cubic foot of steam. We thus perceive that, in the latter case, the work done by cubic foot of steam of the density of 20 lbs. to the square inch, is nearly trebled when worked expansively at the quarter stroke.

There must, however, necessarily be limits to the extent to which this principle of working is carried. As the friction of the machinery is fully equal when the smaller force is employed to what it is when full pressure steam is used throughout, there will, in that respect, be a loss of working power when the steam is employed expansively.

The determination of the extent to which the pins can be carried is to be decided by practice alone. That great advantages must be derived from a proper application of the principle is, however, evident from the preceding consideration of the subject; and it seems strange that this principle, which is admitted to be good, should not be universally adopted—in condensing engines at least. In high-pressure engines the gain would not be so great, because the expanded steam has to act against the pressure of the atmosphere; but even in these engines it would effect a great saving, besides being, as we stated in a former article, peculiarly valuable in locomotives, where a variation of power is required to overcome varying resistances.—*Ironmongers' Advertiser.*

THE IRON TRADE.

The following important evidence on the state of the iron trade, was furnished by Sir J. J. Guest to the committee appointed to consider the question of the Import Duties:—

"A great alteration in the iron trade took place about the year 1740, when pit-coal, for making iron, came into use—previous to that time iron had been all made of charcoal. In 1740 the import was about 25,000 tons a year, consisting almost entirely of bar-iron, and the average import, from 1760 to 1780, was 40,000 tons a year. The trade then began to flourish. The price of iron was 18s. to 20s. per ton.

"*Rate of Duty.*—The rate of duty then charged was 2s. 10d. per ton when brought in foreign ships, and 2s. 1s. 6d. when brought in British ships. In 1786 the import was 44,330 tons; the duty was 2s. 1s. 6d. per ton; and the price began to be reduced, in consequence of the introduction of pit-coal, to 1s. 15s. per ton. From 1786 to 1796 the quantity imported ranged from 44,000 tons the lowest, to 54,000 tons the highest—the duty was then the same, 2s. 1s. 6d. In 1796 the duty was raised to 3s. 1s. 9d. per ton; in 1797 to 3s. 4s. 7d.; in 1798 to 3s. 1s. 9d., and the import of that year was 45,964 tons. In 1799 the import was 42,479 tons. After that year I have no account of the imports till 1820, but the duty was raised in those years during the war. In 1802 it was raised to 4s. 4s. 4d. per ton; in 1803 to 5s. 1s.; in 1806 to 5s. 7s. 5d.; in 1809 to 5s. 9s. 10d.; in 1813 to 6s. 1s. 9s. 10d.; in 1819 it was 6s. 10s. upon iron brought by British ships, and upon iron brought by foreign ships the duty was 6s. 1s. 10d. The import in 1820 was 10,965 tons. The duty was then very high, and the make of iron in this country was rapidly increasing.

"*Quantity of Iron Made.*—I will give the make of iron in this country at different periods. In 1740 almost the whole of the iron of this country was made from charcoal, and the make was 17,350 tons. In 1758, in consequence of the introduction of this new process of making iron with pit-coal, the quantity increased to 68,300 tons, about which time Mr. Watt brought his improvements to bear upon the iron trade, by the introduction of steam-engines for blowing the furnaces, after which time there was a still more rapid increase. In 1796 the quantity produced was 125,000 tons. In the next ten years, down to 1806, the quantity was increased to 258,000 tons; in 1803 the quantity produced was 352,000 tons; the quantity in 1820 was 581,000 tons (this was all pig-iron); in 1828 the quantity was 703,000 tons. From that time to 1831 it became stationary; it rather diminished in 1830, in consequence of the distress which prevailed in the country at that time; from which time the increase has been still more rapid. In 1835 it was estimated at about 1,000,000 tons; in 1836 it was estimated at 1,300,000 tons; and the estimate made by a very intelligent person, who went round the works in 1839, was 1,512,000 tons, which is rather increasing. A very large proportion of the great increase latterly has been produced by the introduction of hot air in the blast-furnace. In 1821 the import was 10,965 tons; in 1823 it was 13,967 tons; in 1824 it came to 14,478 tons; and in 1825 the import was 23,687 tons, there being a very large speculation in that year. At the end of 1825 an alteration took place in the duty. The duty on bar-iron was reduced, under Mr. Huskisson's advice, from 6s. 10s. to 4s. 10s., whether the ships bringing the iron were British or foreign; and the duty on pig-iron was reduced from 17s. 6d. to 10s. Other sorts of wrought iron, not enumerated, charged a duty of 50 per cent., at that time were reduced to 30 per cent. *ad valorem*. Wire, which had previously been 5s. 1s. 6d. the cwt., was reduced to 1s. a cwt. Hoops, which were 1s. 3s. 9d. per cwt., remained at the same duty. The duty on steel was reduced from 50 to 20 per cent. *ad valorem*. The duty remains at present, except that there is a discriminating duty upon iron brought from our colonies, which is not practically in operation. In 1826 the import was 13,587 tons, at a duty of 30s. a ton; in 1827 it was 18,896 tons; in 1828 it was 16,495 tons; in 1831, 17,673 tons; in 1832, 19,437 tons; in 1833, 17,913 tons; in 1834, 16,315 tons; in 1835, 19,750 tons; in 1836, 19,100 tons; in 1837, 19,930 tons; in 1838, 24,600 tons. All this iron is used for steel. Instead of being an importing country, as we were previously to making iron from pit-coal, we now export very largely, from our producing iron cheaper than other countries. The protecting duty has not caused any difference in the increased quantity produced in this country. It has arisen entirely from the increased demand. The foreign iron imported is used almost entirely for steel, for which use it would, at this time, be an increased demand, but that there is a great deal of English iron used for steel, for inferior purposes. The duty, as a protection, is, therefore, nugatory. There is something peculiar in the Swedish and Russian iron, with regard to the peculiar fitness for making steel, which we cannot understand. The produce of that duty is extremely small, if you deduct the quantity exported, which was about 20,000 tons or 30,000 a year. I do not think it produces above 20,000 to 25,000 a year. The best proof with respect to iron being made cheaper in this country than in other countries is, that in America, where there is a large import of Swedish iron, which meets our iron, although not upon fair terms, as they have a discriminating duty between Swedish iron and English iron. In this way all iron in this country is manufactured by rolling, and the Swedish by hammering, and by way of putting a discriminating duty, they have affixed a different and larger duty upon iron made by rolling than upon that made by hammering. The Swedish iron is not so uniform in its quality as ours, but hammered iron is the more valuable of the two, if made with charcoal. The present duty on the importation of iron might be taken away without affecting the trade. If the price were reduced to-morrow, I do not think it would affect the interests of the trade. There are some few persons in this country who make iron for steel; they may consider that less of their iron would be made for steel if the duty were taken off. The present price of Swedish is about 12s. 6d. in cwt., and of common British iron about 7s. Except for the purpose of steel, the country has not imported iron since 1790; so, on the first introduction of British iron there was a great prejudice in the minds of smiths against its use—that were off about 1800; it continued a little longer than that in Ireland, but now ours is entirely an exporting country, with the exception, as I stated before, of iron being imported for steel."

It is here quite plain that the trade has thriven, because of the ingenuity of the people in applying coal to making iron, and in using blast-furnaces. Protection had no influence over them.

Mr. Walker also gave some important evidence, which is particularly valuable, as showing, by the example of hardware, how the protection given to one article impedes the manufacture of another. The same principle holds good in almost all cases—such as wool, for example, the protection given to which was injurious to the cloth manufacturer—such as throw-silk, the protection to which operates against the silk-waver—such as timber, the discriminating duty on which is injurious to the shipbuilder. The 30s. per ton duty on bar-iron has an injurious effect on the sale of goods for which it must be used. Mr. Walker is a large iron factor at Wolverhampton, and his evidence on the subject of protection was to the following effect:—

"The articles principally manufactured at Wolverhampton, chiefly from iron goods, are locks of all descriptions, catches, hinges, and bolts for doors, screws for carpenters, &c.; anvils, vises, and hammers, files, and other smiths' tools; carpenters' tools, as chisels, axes, adzes, augers, &c.; iron sweepers, kettles, pots, &c.; try-chisels, gridirons, coffee and corn mills, cork-screws, setches, &c.; agricultural implements, as hoes, ploughs, spades, shovels, rakes, scythes, &c.; steelyards and scales—balance for plough-traces, cart-traces, &c.; the articles of all descriptions; japanned ditto, as trays, waiters, &c. The amount of protecting duty upon these articles is understood to be about 25 to 35 per cent. Hitherto the protecting duty has been quite nugatory, inasmuch as if the duties were repealed no foreign hardware would come into England, inasmuch as in the competition in our home markets we should save the expense of exporting, and they would have it. No protective duty is at all required for any of these articles in England. A duty of 30s. per ton

